July 28, 2006

Dr. Rodney E. Cluck
Project Manager
Minerals Management Service
381 Elden Street, Mail Stop 4042
Herndon, VA 20164

RE: Comments on the Notice of Intent to Prepare an EIS on the Cape Wind Project

Dear Dr. Cluck:

The Natural Resources Defense Council, Inc. (NRDC) respectfully submits these comments in response to the May 30, 2006 notice in the Federal Register (71 FR 30693) on the Mineral Management Service (MMS) Notice of Intent (NOI) to Prepare an Environmental Impact Statement (EIS) on the proposal by Cape Wind Associates, L.L.C. (Cape Wind) to construct a utility-scale wind turbine installation and associated infrastructure in Nantucket Sound ("Cape Wind Project").

NRDC is a national environmental advocacy organization with its headquarters in New York City. NRDC has over 1.2 million members and e-activists nationally. NRDC uses law, science and the support of our members and online activists to protect the planet's wildlife and wild places and to ensure a safe and healthy environment for all living things. Combating global warming and protecting the marine environment are two of NRDC's top environmental priorities. The deployment of appropriately sited and environmentally sustainable renewable energy technologies in the United States is essential to achieving both of these goals, especially given the devastating consequences that marine environments are likely to suffer from continuing unchecked global warming. At the same time, offshore renewable energy projects like the Cape Wind Project will utilize areas of the ocean that are held in common by citizens of the United States, and so NRDC strongly supports comprehensive environmental reviews prior to the siting and operation of such projects to consider all of their direct and indirect environmental effects, including potential impacts on coastal and marine life and habitats, the safety of local and migratory bird populations, visual impacts, and noise.

The situation with respect to the Cape Wind Project is unique, however, in that several years of rigorous environmental review have already taken place on this project under the direction of the U.S. Army Corps of Engineers (USACOE) and a large body of data on the project's environmental impacts has already been gathered and presented in the USACOE's draft EIS. Therefore, NRDC is attaching the comments that it submitted in response to the USACOE draft EIS and incorporating them by reference into these scoping comments. NRDC recommends that MMS focus the current EIS on addressing the specific issues raised in the comments where further study was identified as important rather than engaging in a time-consuming replication of all the research that has already been done.

NRDC would also like to draw MMS' attention to the scoping comments to this NOI submitted by the Conservation Law Foundation (CLF). NRDC has reviewed those comments and joins in and endorses both CLF's approach to the amount of review that they suggest at this stage and the specific recommendations they offer regarding areas requiring further study. As CLF properly concludes:

> The Cape Wind Project is an important step in weaning New England away from a fossil fuel economy, towards a more sustainable energy future. Compelling public policy reasons support expeditiously moving forward with the environmental and permitting review of the Cape Wind Project. The Draft EIS should be used as an opportunity to update and fine-tune the analysis presented in the ACOE Draft EIS, not to further delay action on this important project.

In commenting on the draft EIS prepared by the Army, NRDC urged further study on a number of issues, most particularly the analysis of Cape Wind's potential impacts on local and migratory bird populations, especially the population of the Roseate tern, which is listed as endangered under both federal and Massachusetts law. Since that time, it is our understanding that Cape Wind, working in conjunction with Massachusetts Audubon, has conducted further research on these issues. NRDC urges MMS to consider as part of this EIS the results of any such further avian impact studies so that the public can review and comment on them and the extent to which they might address the issues raised in our earlier comments.

Moving forward expeditiously with the second round of the Cape Wind EIS is an important first step toward harnessing the vast renewable energy resources available off our nation's coasts in an environmentally sustainable manner.

Thank you for your attention to these comments and please let me know if you have any questions or require further information.

Sincerely,

/S/

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Attachment: NRDC Comments on USACOE Cape Wind Project Draft EIS, 2-24-05

COMMENTS OF
NATURAL RESOURCES DEFENSE COUNCIL, INC.
ON THE
CAPE WIND ENERGY PROJECT
DRAFT ENVIRONMENTAL IMPACT STATEMENT
U.S. ARMY CORPS OF ENGINEERS REFERENCE FILE NAE-2004-338-1
FEBRUARY 24, 2005

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INTRODUCTION

The Natural Resources Defense Council, Inc. ("NRDC") respectfully submits these comments on the Draft Environmental Impact Statement/Draft Environmental Impact Report/Development of Regional Impact ("DEIS") for the proposal by Cape Wind Associates LLC ("Cape Wind") to construct the Cape Wind Energy Project, a 130 turbine offshore wind project proposed in federal waters in Nantucket Sound off Cape Cod, Martha's Vineyard and Nantucket, Massachusetts. NRDC is a national environmental advocacy organization with its headquarters in New York City. NRDC has almost 500,000 members nationally, including almost 18,000 in Massachusetts. NRDC uses law, science and the support of our members and online activists to protect the planet's wildlife and wild places and to ensure a safe and healthy environment for all living things. Combating global warming and protecting the marine environment are two of NRDC's highest priorities.

NRDC has long been a strong supporter of increased use of wind energy. The technology for producing electricity from wind energy has improved greatly over the past twenty years, and wind—on and offshore—now represents one of the most promising sources of emissions free electricity. More than 4200 megawatts ("MW") of wind power have been installed on land in the United States, most of it in the West, and in the process much has been learned about siting and designing wind generation to minimize environmental damage. Recent proposals for offshore wind farms—most prominently Cape Wind—have focused attention on the benefits and impacts of offshore wind. Cape Wind and other offshore proposals for wind electricity generating facilities off the East Coast present an opportunity to boost significantly the amount of energy produced from

renewable sources in the eastern United States. Indeed, offshore wind power is probably the region's largest untapped renewable energy resource. Developing this resource is essential to help reduce local, regional and global air pollution that threatens public health, critical habitat, and the very sustainability of the planet.

At the same time, offshore wind energy projects will utilize areas of the ocean that are held in common by citizens of the United States, and, if improperly sited and designed, could pose risks to natural resources in biologically-rich near shore waters. Renewable energy projects must not – and need not – undermine protection of coastal habitats and living marine resources. To further this goal, prior to the siting and operation of such projects, NRDC strongly supports comprehensive environmental reviews to consider potential impacts on coastal and marine life and habitats, the safety of local and migratory bird populations, visual impacts, and noise. However, no form of power generation is without some impacts. Therefore, environmental reviews should also address the substantial near- and long-term environmental benefits that wind projects can provide to allow a balanced assessment of proposed projects, particularly in comparison to other forms of electricity generation.

With these principles in mind, NRDC has a strong interest in the environmental and public health benefits of the Cape Wind Project, which would provide up to 450 MW of electric power without emitting any air pollution. At the same time, NRDC has also strongly supported a full environmental review process for the Cape Wind Project to ensure that both its benefits and impacts are fully analyzed and disclosed, and that any negative environmental impacts are fully mitigated. NRDC staff and outside experts, working in coordination with the Conservation Law Foundation, have now reviewed the

4,000 page Draft Environmental Impact Statement ("DEIS") prepared by the U.S. Army Corps of Engineers for the Cape Wind project.[1] NRDC's review of the DEIS focuses on the three substantive areas that we have identified as most crucial to understanding the benefits and impacts of the Cape Wind Project. In Section I, we discuss the substantial air pollution and public health benefits of the Cape Wind Project, which are areas where the DEIS's discussion should be amplified. In Section II, we discuss the DEIS's analysis of potential acoustic impacts of the Project on marine species, particularly during construction, and we recommend additional mitigation measures to minimize the potential for any marine mammal impacts. In Section III, we discuss the DEIS's analysis of the potential impacts of the Project on the endangered Roseate Tern and recommend a pathway toward better understanding these potential impacts and toward fully exploring available operational and design options to minimize or avoid any such impacts. Lastly, in Section IV, we discuss proposed next steps for the project and outline an approach to developing an adaptive management program that will ensure that any unexpected post-operational impacts are monitored and mitigated.

NRDC believes that the public interest will be best served if the Cape Wind Project continues through the permitting process, and, if possible, to construction and operation. This will depend upon an ultimate determination that the Project's benefits outweigh its impacts, that the Project is consistent with protection of wildlife and ecosystems in Nantucket Sound and that it complies with all applicable laws. The Project has cleared many hurdles during a long and public environmental review and permitting

[1] NRDC would like to thank and acknowledge the assistance of Dr. Jan Beyea in assisting NRDC in analyzing the avian sections of the DEIS and Dr. Christopher Clark in analyzing the acoustic and marine mammal sections.

process. However, not surprisingly for a project of this size and complexity, and the first of its kind in the United States, the Project's quite thorough environmental review has left some questions still unresolved. The Project's potential impacts on the endangered Roseate Tern are a key area where more answers are needed. It is important that this issue be addressed and resolved in the near future in the context of finalizing the EIS. We strongly hope that additional analysis and, if necessary, any additional data collection, will demonstrate that the Project is consistent with marine wildlife protection, allowing the Project to proceed. We stand ready to participate in any further regulatory, scientific review or stakeholder process necessary to achieve this goal.

I. THE PUBLIC HEALTH AND ENVIRONMENTAL BENEFITS OF THE CAPE WIND PROJECT.

The DEIS focuses almost exclusively on the potential negative environmental impacts from the proposed Cape Wind project, but unlike most large power plant projects, the Cape Wind project would provide large and important air quality and public health benefits. While the DEIS provides sufficient quantification of the reduction in air pollution, more needs to be said about the importance of these reductions on a local, regional and global level. The final EIS should also provide a greater discussion of the importance of renewables generally and of this project in particular. Finally, all of the Project's benefits should be brought together in one section that allows for a clear presentation of these benefits and the broader context that they provide.

A. Air Quality and Public Health Benefits

As part of the needs analysis, Cape Wind hired La Capra Associates to assess the air pollution emissions reductions associated with the operations of the proposed project.

Using marginal emissions rates from the year 2000 for the New England Power Pool, La Capra estimated that the project would result in annual emissions reductions of about 1,180 tons of nitrogen oxides (NOx), 4,000 tons of sulfur dioxide (SO_2), 949,000 tons of carbon dioxide (CO_2), a "few hundred" pounds of mercury, and an unspecified amount of particulate matter. DEIS at 5.15.2. For the purposes of assessing the public health benefits, the DEIS uses an estimate of 177 tons per year based on the average year 2000 emissions of three plants in the Cape region. The DEIS discussed these reductions in terms of the regulatory requirements that the Project and Massachusetts face, and the section on public health benefits from the project provides some assessment of the importance of reductions in particulate matter. DEIS at 5.16.4.3. However, there is insufficient explanation of the broader public health benefits associated with reducing emissions of each of these pollutants.[2]

i. Local Benefits

Even though the assessment of potential emissions reduction for mercury and particulates relies on data from past years, there is no doubt that reductions will occur and that they will provide important public health benefits. Indeed, the assessment of the potential public health benefits from reduced particulate emissions contained in the DEIS provides a clear picture of how important the air pollution benefits of the project could be.

Particulates. Unlike NOx, SO_2, and CO_2, for which the DEIS draws on NEPOOL marginal emissions rates for particulates, due to lack of better data the DEIS

[2] The information presented in these comment on health effects from air pollution draws heavily from materials prepared by Synapse Energy Economics including especially: Woolf, et. al., *Air Quality in Queens County: Opportunities for Cleaning Up the Air in Queens County and Neighboring Regions*, Synapse Energy Economics, May 2003. The health effects information in this report was researched and written by: Dr. Jonathan Levy, Patrick Kinney, Susan Greco and Kim Knowlton.

simply uses the average year 2000 particulate emissions rate for three plants in the Cape region. See notes at Table 5.16-4. As a result the public health benefits calculated in the DEIS should be considered indicative rather than precisely predictive. Nevertheless, they provide a clear picture of the public health importance of this pollutant and the importance of the Project in reducing its emissions.

Particulate matter can contain many different chemicals or substances, and can vary greatly in size. The term "PM_{10}" refers to particles less than 10 micrometers (μm) in diameter. Similarly, "$PM_{2.5}$" refers to particles less than 2.5 μm in diameter. A large body of work has been developed over the past several decades, documenting significant health impacts from exposure to PM_{10}. However, over the past decade, evidence has grown of even greater health risks from fine particulate pollution. Fine particles are believed to pose greater health risks than larger particles, because they are small enough to be inhaled deep into the lungs, while larger particles tend to be deposited in the upper airways. In fact, some scientists are beginning to discuss "ultrafine" particles, less than 0.1 μm in diameter, as potentially the most dangerous particles.[3]

In response to the growing evidence of health impacts from fine particulates, EPA promulgated new ambient air standards for fine particulate matter in 1997. (Previously, only PM_{10} had been regulated.) As the DEIS points out, Massachusetts is expected to be designated "attainment/unclassifiable" due to insufficient data. However, even at levels below the National Ambient Air Quality Standards reduction in fine particulate emissions can have important health benefits.

[3] Spengler J, Wilson R 1996. "Emissions, dispersion, and concentration of particles," in Wilson R and Spengler JD. (eds): *Particles in Our Air: Concentrations and Health Effects*, Harvard School of Public Health.

Two of the most important fine particle types are secondary sulfate and nitrate particles. The term "secondary" refers to the fact that they are formed in the atmosphere, as the primary pollutants emitted from smokestacks react with each other and naturally occurring substances. Sulfates are formed in the atmosphere when SO_2 gas reacts with ammonia gas, and nitrates form in reactions involving NO_x emissions. On average, sulfates and nitrates together make up about half of ambient fine particulate matter in the Northeast. As discussed later the estimates of NOx and SO_2 emissions reductions are only first order estimates, but still the Cape Wind project will certainly reduce the levels of both primary and secondary fine particulate emissions.

Fine particulate matter can travel long distances in the atmosphere, meaning that power plants across a wide geographic area contribute to fine particulate pollution in New England. However, the maximum pollutant concentrations from any given source are generally close to the source – anywhere from less than a mile to tens of miles, depending on the height of emission and the type of particulate matter.[4] Thus, New England residents will benefit more from reductions in fine particulate emissions at New England power plants than from reductions at plants in other upwind states.

A large body of scientific work documents a range of health impacts, including premature death especially from cardiopulmonary and lung cancer related complications, from short-term exposure to PM_{10}. A recent summary article found well over one hundred published studies, and the findings of these studies are extraordinarily

[4] Levy JI, Spengler JD 2002. Modeling the benefits of power plant emission controls in Massachusetts. J Air Waste Manage Assoc 52: 5-18. Levy JI, Spengler JD, Hlinka D, Sullivan D, Moon D 2002. Using CALPUFF to evaluate the impacts of power plant emissions in Illinois: Model sensitivity and implications. Atmos Environ 36: 1063-1075.

consistent.[5] However, over the past decade several important studies have focused attention on fine particulates. Two of the most compelling studies are prospective cohort studies that control for potential confounding factors at the individual level, such as smoking, age and occupational exposure. These studies are known as the Six Cities study and the American Cancer Society study.[6] Though other cohort studies exist, these two studies are most often cited, primarily because they have undergone extensive scrutiny and re-analysis.

In 2000, the Health Effects Institute (HEI) released two much anticipated reports on the health effects of fine particulate matter: the *National Mortality, Morbidity and Air Pollution Study* and the *Particle Epidemiology Re-Analysis Project*.[7] Both studies strongly support the results of the Six Cities and American Cancer Society studies, and resolve some of the uncertainties identified in those studies (particularly with respect to the extent to which the health effects discussed in these studies could be attributed to other pollutants).

Using a study by the Harvard School of Public Health, the DEIS calculates that reduced particulate emissions due to the Cape Wind project could avoid 12 premature deaths, 20 cases of bronchitis, 200 emergency room visits, 5,000 asthma attacks, 15,000 restricted activity days, and 35,000 respiratory symptom days. These public health benefits would have an annual monetary value of about $53 million. DEIS at 5.16.4.3 page 5-270.

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[5] Stieb DM, Judak S, Burnett RT 2002. Meta-analysis of time-series studies of air pollution and mortality: Effects of gases and particles and the influence of cause of death, age, and season. J Air Waste Manage Assoc 52: 470-484.
[6] Dockery DW, Pope CA III, Xu X, Spengler JD, Ware JH, Fay ME, Ferris BG Jr., Speizer FE 1993. An association between air pollution and mortality in six U.S. cities. New Eng J Med 329: 1753-1759.
Pope CA III, Thun MJ, Namboodiri MM, Dockery DW, Evans JS, Speizer FE, Heath CW Jr. 1995. Particulate air pollution as a predictor of mortality in a prospective study of U.S. adults. Amer J Respir Crit Care Med 151: 669-674.
[7] Health Effects Institute, The National Morbidity, Mortality and Air Pollution Study, July 2000. Health Effects Institute, Reanalysis of the Harvard Six Cities Study and the American Cancer Society Study of Particulate Air Pollution and Morbidity, July 2000.

In sum, very real and measurable health benefits will accrue to the citizens of Massachusetts and New England if ambient fine particulate levels are lowered, and it is critical to factor these benefits into assessments of the proposed Cape Wind project.

Mercury and Other Toxics. A wide variety of air pollutants have been classified as toxic. Mercury is by far the most important air toxic in the electric power industry, due to the quantities in which it is emitted by coal-fired plants and its health impacts. However, fossil-fired power plants also emit a range of toxic substances. Combustion of natural gas, for example, produces appreciable levels of formaldehyde, a product of incomplete methane oxidation, and plants burning residual oil often emit significant levels of nickel. Municipal solid waste incinerators, which burn about 40 percent fossil-fuel based products, produce a significant amount of mercury and are also a major source of dioxins. Dioxins have been demonstrated to be highly carcinogenetic, even in extremely small amounts. Though substances like these rank behind mercury in terms of the total health risks posed, reducing the levels at which they are emitted will provide benefits.

Fish consumption is the dominant exposure pathway for methylmercury, the form of mercury most dangerous to humans. As airborne mercury is deposited in lakes and rivers, it accumulates in sediments and in the tissues of certain species of fish. Populations that regularly consume local fish – generally lower income populations – and pregnant women and children are most at risk. Methylmercury is a developmental neurotoxin that damages the nervous systems of fetuses and children following a brief exposure period. Advisories warn citizens not to eat fish from specified lakes and rivers in over 40 U.S. states, including Massachusetts.

ii. Regional Benefits

Because NOx and SO_2 emissions are easily transported by the wind, they can impact large regions. In part because of this, SO_2 has been regulated under a national cap and trade system for over a decade and NOx emissions are regulated under a regional cap and trade system in the Northeast. Because of the trading mechanism involved in these regulations, the emissions reductions estimated by La Capra in the DEIS can only be considered first order estimates. However it is reasonable to expect that the presence of the Cape Wind project would eventually enable the lowering of the caps for these pollutants and that some if not all of the emissions reductions estimated by La Capra could be locked in through other regulatory mechanisms. Certainly the cap and trade systems are essential to maintaining this trend, but the simple fact is that cleaner, newer resources are what make it possible and the Cape Wind project would greatly contribute to continuing these trends. We also note that a recent New England Power Pool analysis of marginal emissions rates in New England shows a regular downward trend in emissions, which the analysis attributes to the addition of less polluting resources.[8] This suggests that the addition of Cape Wind will continue and increase this trend. Even if only a portion of the estimated emissions are realized, the final EIS should contain a greater discussion of the public health benefits that would accrue from reducing this two important pollutants.

Nitrogen Oxides. Nitrogen oxides (NO_x) are regulated as a criteria pollutant because they have been shown to have both environmental and human health impacts. On the environmental side, NO_x combines with water in the atmosphere to form nitric

[8] 2003 NEPOOL Marginal Emissions Rate Analysis, Dec. 2004 at 9. http://www.iso-ne.com/Planning_Reports/Emissions/Marginal_Emissions_Analysis_2003.pdf

acid, which contributes to the acidification of lakes and soils. On the public health side, NO_x is a precursor to both fine particulate matter and ground-level ozone, or "smog."

Emissions of NO_x are a major contributor to two of the most important airborne health threats in the world – ozone and fine particulates. Like nitrates and sulfates, ozone is a secondary pollutant. Ozone is formed most intensively during the summer months through reaction of NO_x, volatile organic compounds, and sunlight. The reaction is temperature dependent, and more ozone is formed from these precursors at higher temperatures.

In Massachusetts, as for much of the East Coast, NO_x emissions have been regulated via a regional cap during the "ozone season," the period from May 1 through September 30 of each year. This is the period during which ozone formation causes the most significant air pollution problems and health impacts. As noted in the DEIS, DEIS at Section 5.15, page 255, the Massachusetts Department of Environmental Protection ("MADEP") has established an allotment of NOx emissions credits that would be available to a project such as Cape Wind. If the project collects these credits and sells them to other potential emitters, and these other plants actually emit more pollution as a result, then the La Capra estimates would overstate emissions reductions by the amount of credits allocated to the project. However, as is discussed above, there is ample reason to believe that the Project would help to enable a continuing trend in lowering these emissions beyond what the current cap and trade system drives.

In 2004, EPA promulgated a new 8-hour ozone standard and Massachusetts is in moderate nonattainment, which will require the state to go significantly further than the current State Implementation Plan based on a 1-hour standard. Thus it is very likely that

the Cape Wind project would become part of the Massachusetts State Implementation Plan to reduce ozone levels effectively locking in the Cape Wind emissions reductions.

Ozone is a strong oxidant gas that, upon inhalation, causes damage to the sensitive cells deep within the lung. Ozone exposure has been associated with a variety of respiratory effects in both human chamber studies (in which human subjects are exposed to controlled levels of ozone) and epidemiological studies. These effects include pulmonary inflammation, decreases in lung function and the precipitation of asthma attacks.

Epidemiological studies have reported acute associations between ozone and a number of health outcomes, including respiratory symptoms, asthma exacerbations, emergency room visits, hospital admissions, and deaths. One recent article summarized this literature and provided estimates for three acute health outcomes that tend to contribute most to the total impacts of ozone – premature deaths, hospital admissions for respiratory causes, and days with minor restricted activities.[9] In addition, a growing body of research indicates that there are long-term health effects associated with chronic (as opposed to acute) exposure to ozone.

Sulfur dioxide. Sulfur dioxide (SO_2) is a criteria pollutant and the major contributor to acid rain. SO_2 also contributes to respiratory illness, especially among children and the elderly and results in visibility impairment through the formation of haze. SO_2 is emitted from fossil fuel generation when elemental sulfur is present in the fuel source. Because of the relatively high sulfur levels in coal, coal-fired power plants

[9] Levy JI, Carrothers TJ, Tuomisto J, Hammitt JK, Evans JS 2001a. *Assessing the public health benefits of reduced ozone concentrations*. Environ Health Perspect 109: 1215-1226.

are responsible for the vast majority of electric utility SO_2 emissions. The electric generating sector is responsible for over 65 percent of U.S. SO_2 emissions.[10]

Atmospheric SO_2 and NO_x interact with water vapor and other gases to form acidic solutions of sulfuric and nitric acid. Deposition of these acids, commonly known as acid rain, occurs when these acidic solutions (or their gaseous and particle-based counterparts) fall to the earth. Acid rain damages the natural environment by changing soil composition, acidifying lakes and streams, and harming forests and vegetation. The acidification of water bodies often results in their inability to support aquatic or plant life. Long-term exposure to acid rain poses a serious threat to the health and biodiversity of an ecosystem. Acid rain also accelerates the decay of buildings and monuments.

The EPA's Acid Rain program was established to achieve the SO_2 reduction goals of Title IV of the Clean Air Act. The program, which is currently in its second phase, utilizes market-based mechanisms such as emission allowance auctions and trading to obtain SO_2 emission reductions at over 2,000 fossil-fueled generating units across the country. As noted, the Acid Rain program has been successful, but additional reductions are necessary. A 1995 EPA study estimated that SO_2 and NO_x emissions need to be reduced another 40-50 percent beyond Clean Air Act requirements in order to protect sensitive ecosystems.[11]

Thus, while it is possible that initially any reductions in SO_2 emissions caused by the Cape Wind project will simply be turned into credits and sold to allow higher emissions at other sources, in the long run, it is also likely that the presence of Cape

[10] See US EPA, *Air Quality Where You Live,* available at http://www.epa.gov/air/urbanair/
[11] See: Governor Pataki's Environmental Press Release, *Governor Pataki Proposes Toughest Acid Rain Controls in the Nation,* February 14, 2002. Available at http://www.dec.state.ny.us/website/press/newrelgv.html.

Wind and other zero tailpipe emissions projects similar to it will help to sustain the trend toward lower emissions and to justify lower SO_2 emissions caps.

iii. Global Benefits: Global Warming.

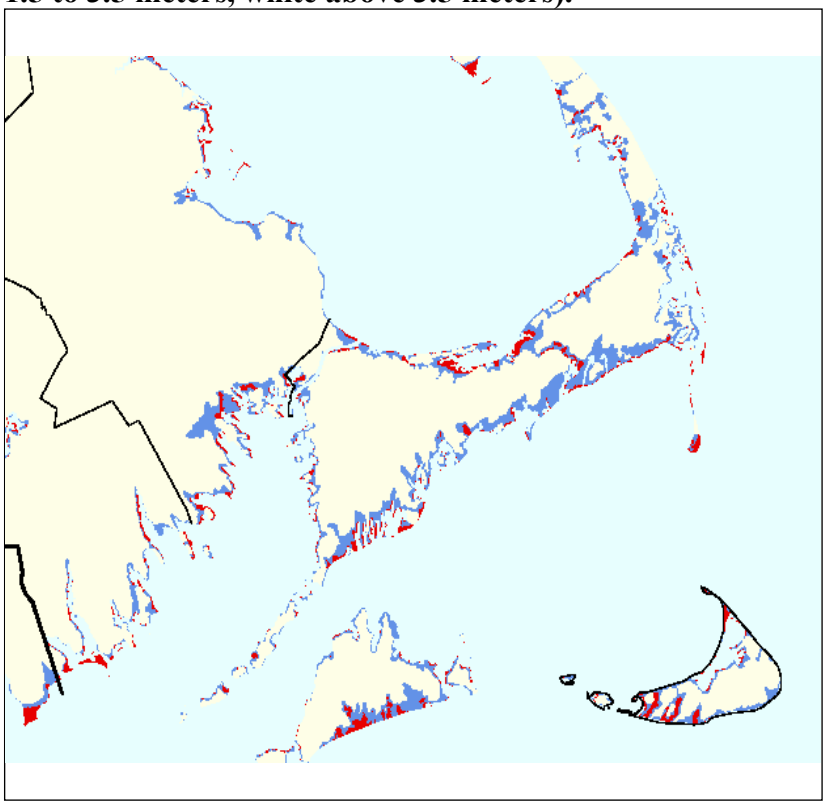
Global warming is one of the greatest environmental threats facing the world today. Despite this, it receives only passing mention in the DEIS with virtually no discussion of its already mounting impacts on public health, wildlife, habitats and the economies of the world, including New England and Cape Cod. Carbon dioxide (CO_2) is the most prevalent of the greenhouse gases – gases that are trapping heat in the earth's atmosphere and warming the earth's surface. Consequences of climate change include the spread of infectious diseases, an increase in the frequency and severity of extreme weather events, coastal zone flooding, loss of habitat, and agricultural disruption. Power generation is the largest U.S. source of CO_2, responsible for nearly 40 percent of total U.S. emissions.

In July 2003, the United Nations World Meteorological Organization (WMO) released a report stating that recent severe weather events including heat waves and severe storms are attributable to global warming.[12] The WMO notes that the number of such events have been increasing during the past several years. Past studies of the regional impacts of such severe weather events and potential sea level rise have suggested that New England and in particular the Cape and Islands are vulnerable to global warming. Figure 1 shows the parts of the Cape and Islands that would be flooded by a 1.5 and 3 meter storm flood.[13]

[12] "Extreme weather set to increase" at http://www.news24.com/News24/Technology/News/0,,2-13-1443_1381680,00.html.

[13] J.G.Titus and C.Richman, 2000, "Maps of Lands Vulnerable to Sea Level Rise: Modeled Elevations Along the U.S. Atlantic and Gulf Coasts." Climate Research 2000. Elevations based on computer models, not actual surveys. Coastal protection efforts may prevent some low-lying areas from being flooded as sea level rises. The 1.5-meter contour

Figure 1. Potential areas of flooding from sea level rise (red-below 1.5 meters, blue-1.5 to 3.5 meters, white above 3.5 meters).



More frequent flooding in the near-term and sea level rise will not only destroy extremely valuable property in the Cape and Island regions, but will also destroy much of the habitat used by birds, including, particularly, the endangered Roseate Terns discussed in other parts of these comments.

Global climate models also predict that worldwide daily mortality and morbidity due to extreme heat events could significantly increase in this century, especially among the elderly poor who often have pre-existing health conditions and may lack air conditioning or access to air conditioned spaces. Other health impacts of climate change

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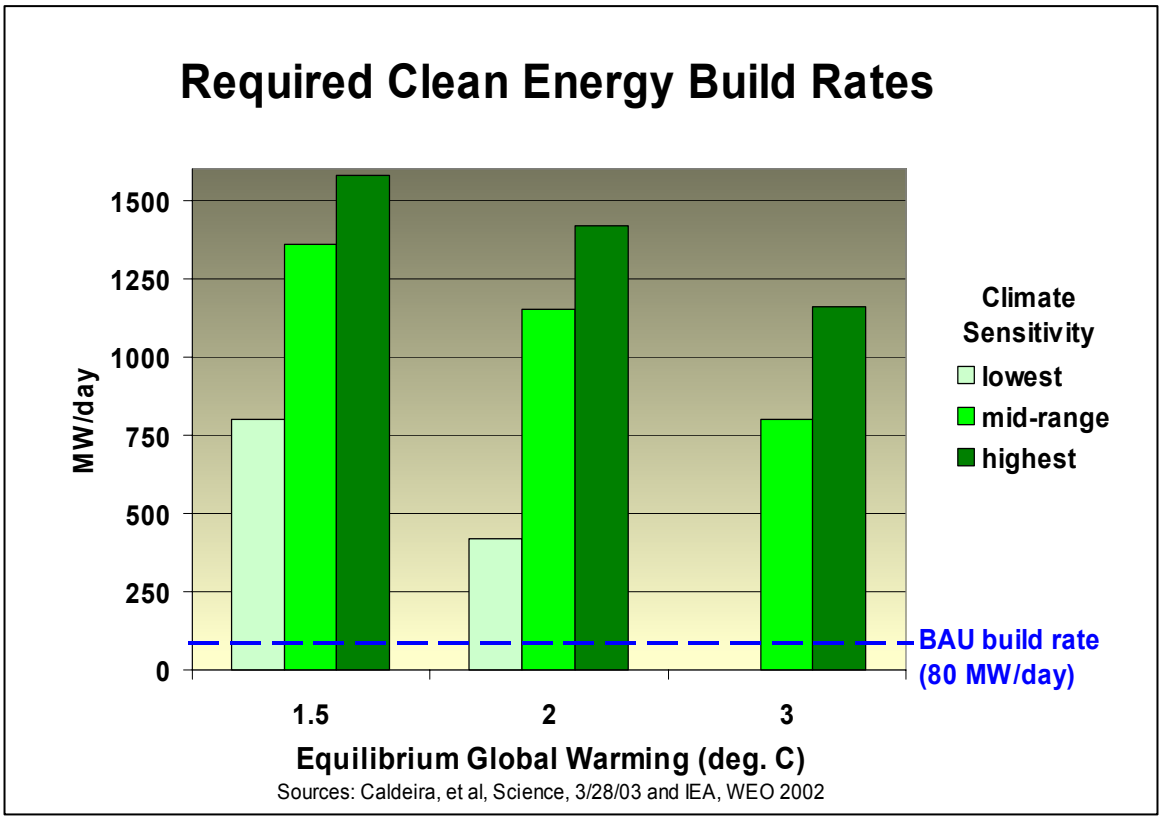
depicted is currently about 1.3-meters above mean sea level, and is typically 90 cm above mean high tide. Parts of the area depicted in red will be above mean sea level for at least 100 years and probably 200 years. The 3.5-meter contour illustrates the area that might be flooded over a period of several centuries. However the window of opportunity to avoid significant global warming and the likely accompanying sea level rise through by reducing anthropogenic greenhouse gas emission is estimated to close in about 10 years.

could include increased rates of secondary air pollutant formation (e.g., ground-level ozone and particulate matter), incidence of vector-borne and water-borne diseases and, as noted, increased frequency and severity of storms.[14]

Of course, the Cape Wind project will not, in and of itself, stop global warming. However, it is, to our knowledge, the largest single source of supply-side reductions in CO_2 currently proposed in the United States, and perhaps in the world. Furthermore given current rates of greenhouse gas emissions and the current concentration of these gases in the atmosphere, it is possible to estimate the amount of zero-carbon emission electricity resources we need to be adding per day to avoid unacceptable levels of global warming. Figure 2 shows the required levels given different potential levels of warming and different potential sensitivities of the global temperature to greenhouse gases. The figure also shows the IEA's forecast of the rate at which we are likely to build these resources over the next 30 years—less than one-tenth of what we need to be building to avoid a 2 degree Celsius warming given a mid-range sensitivity to greenhouse gases. The only way we can be sanguine about the rate at which we are currently building resources such as Cape Wind is if we assume that we can tolerate a 3 degree Celsius warming and that the climate is extremely insensitive to greenhouse gases. (Note that the temperature difference between today and the last ice age is just 5 degrees Celsius).

[14] *Climate Change and Public Health: Impact Assessment for the NYC Metropolitan* Region at http://metroeast_climate.ciesin.columbia.edu/health.html.

Figure 2. Required Clean Energy Build Rates.



The final EIS should contain a much more detailed discussion of the importance of the potential CO_2 emissions reductions, their benefits and the context in which the Cape Wind project's emissions reductions would occur.

B. Other Environmental Benefits

i. Reduced Fossil Fuel Use

The discussion of the No-Action Alternative gives only passing mention to the broad benefits of reduced reliance on fossil fuels that the Cape Wind project offers. The final bullet in Section 3.3 reads: "[Under the No-Action Alternative] Secondary environmental impacts related to fossil fuel production, transportation and storage will continue or increase (such as mining of coal, LNG transportation safety, oil spills from marine barges, natural gas pipeline construction etc.)." DEIS at 3.3 page 2-28. Obviously these impacts would not cease if the Cape Wind project is built, but the Project would be

an important and precedential step in our country's efforts to reduce these impacts. And these impacts are not parenthetical. Mining and drilling for fossil fuels causes untold destruction of habitat and water pollution. Fossil fuel transportation causes air pollution and requires pipelines across wild and untouched parts of our country. The people and wildlife of Cape Cod and the Islands have suffered repeatedly from oil spills and other fossil fuel-related impacts in the last century.

Fish impacts are a good example of these related impacts. The DEIS finds that the impacts of fish populations will be minimal and temporary. DEIS at 5.4. In contrast, the impacts of fossil fuel and nuclear power plants on fish are significant and permanent. Most existing fossil fuel and nuclear power plants use tremendous amounts of water for cooling. Where these power plants are located next to lakes, rivers or the ocean, it is common practice for them to use what is known as once-through cooling, which entails sucking lake, river, or ocean water into the plant's cooling system, where it absorbs waste heat, and then dumping the hot water back into the lake, river or ocean. This process kills thousands of fish, especially eggs and juvenile fish, at each power plant that uses it. The hot water also destroys habitat. New power plants are increasingly shifting to different cooling systems that use less water and kill fewer fish. However, the Cape Wind project will still reduce power plant fish kills to the extent that it displaces existing generation with once-through cooling systems. Moreover, by reducing fossil fuel use, the Project would make a positive difference and by laying a foundation of experience with offshore wind, the project would help make a much larger difference.

The final EIS should be clear that while the Project's potential contribution to reducing these impacts is difficult to quantify, it is a clear project benefit. And, in fact, as

the first potential offshore wind project, it is more important than any single set of numbers would make it appear.

ii. Environmental Justice

While the DEIS contains a technically sufficient discussion of the environmental justice impacts of the project, at Section 5.16.4.9, there is no acknowledgement in this section or in the No-Action Alternative that if the project is not built, existing environmental justice impacts will at least continue unabated and may increase. The existing power generation system disproportionately impacts poor communities and communities of color. If the project is built, these disproportionate impacts will be lessened. If it is not, they will continue and probably get worse as the overall demand for electricity continues to grow and the goal of developing renewable resources and offshore wind in particular is dealt a major setback. The final EIS should explicitly acknowledge that by reducing air pollution across New England and reducing the need for new power plants and displacing existing generation, the Cape Wind project will help to reduce disproportionate public health impacts on poor communities and communities of color.

II. ACOUSTIC IMPACTS

The Project's acoustic (noise) impacts must be carefully analyzed, particularly for marine mammals, whose physiological health and well-being can be damaged by harmful noise levels, and appropriate mitigation measures must be deployed. The current analysis of the Project's acoustic impacts in the DEIS needs to be corrected, expanded and improved in the FEIS, and, most importantly a more robust framework for monitoring and mitigation must be included in the FEIS. If the practical steps recommended in

these comments are taken, Project construction and operation can be made consistent with protection of marine mammals.

A. Overall Noise Analysis

The DEIS section on noise (Section 5.11) needs to be revised to focus on the forms of noise that are harmful to the animals who will be in the closest proximity to the turbines, rather than examined through an anthropocentric perspective of noise impacts on humans. For example, Section 5.11.1.1, on acoustic concepts, focuses on "loudness" and "pitch." But the terms "loudness" and "pitch" are actually psychological concepts, encapsulating the concept of what a human perceives when experiencing the relative intensity or pressure of a sound. The FEIS analysis should not discuss "loudness" but the actual physical measures to which it pertains, e.g., intensity, energy flux density, pressure. These measures should be referenced consistently either in terms of levels in dB or in absolute terms, for example, Watts per meter squared. Distinctions between the dB measurements reference levels used for in-air (20 μPa) and in-water (1 μPa) must be crystal clear and consistent.

The discussion of human hearing is relevant to possible in-air responses of humans and serves perhaps to introduce the reader to some basic auditory concepts that they can relate to. However, the species of greatest concern relative to auditory impacts are those that might be exposed to acute levels or chronic levels of noise with the potential to cause physiological harm, or whose response to noise generated either in-air or underwater. The FEIS must discuss auditory impacts relative to the animals of concern, such as marine mammals and sea turtles. In cases where information is not available, the usual practice of using a surrogate species and making conservative

assumptions is recommended. Thus, the practice here of using A weighted sound level curves is inappropriate and potentially misleading. The potential noise impacts will not be on humans, they will be on non-human animals.

B. Underwater Noise Impacts

The current treatment of underwater sound in the DEIS is incomplete and includes some inaccuracies that require correction. The characteristics of the Project's various underwater sounds expected to be generated during construction and operation are crucial to understanding the Project's potential impacts on marine mammals. There are well-documented recording and analysis methods available for the characterization and quantification of underwater sound. The DEIS, however, characterizes the sounds to be generated by jet plows used in construction by reference to subjective reports from human divers. See Section 5.1.2.6. Instead of this anthropocentric approach, the FEIS should rely on descriptions of underwater acoustic characteristics from construction that can be found in the FEIS and subsequent technical reports from the BP Exploration (Alaska) Inc. Northstar project. In other instances, too, the DEIS incompletely describes acoustic impacts.

C. Acoustic Impacts on Marine Mammals: Need for Monitoring and Mitigation

There are two levels of harm to marine mammals that have the potential to arise from acoustic impacts: "level A" refers to physiological damage including hearing loss, TTS, air bladder rupture and hemorrhaging; "level B" refers to harassment activities which can disturb and disrupt marine mammals and their behavior patterns. In our assessment, Level A impacts on marine mammals as a result of the Project are unlikely. However, the likelihood of level B impacts on marine mammals during Project

construction is much higher given the density in space and time of the construction activities – especially due to acoustics from pile driving and support vessels.

Accordingly, the FEIS needs to include strong, viable mechanisms that will require the Project to monitor for acoustic events that might put animals at risk from both damage and harassment, and it needs to have effective mechanisms in place to mitigate should the monitoring system detect/predict the approach of an unacceptable level of risk. Specific requests for FEIS and conditions for any permit include (1) appropriate characterization of underwater acoustic signals, including ultrasound, (2) use a robust system of both acoustic and visual surveillance for marine mammals and sea turtles during construction, (3) schedule the time of construction activity so as to avoid periods of peak abundance for endangered species such as right whales, and (4) include a monitoring plan that will provide ongoing data on possible impacts for use in adaptive management. We also propose the following specific measures to minimize any potential impacts on marine mammals.

Safety radius. The DEIS proposes use of a "safety radius" of 500 m to protect marine mammals and sea turtles during construction. Section 5.5.5.1.1, page 5-77. The area of this zone of potential impact, about 1/3 of a square mile, is substantial. The FEIS must ensure that the exclusion zone for noise exposure will be effective by including a strong plan for establishing pre-construction, site-specific acoustic characteristics (e.g., ambient noise levels, transmission loss), and for monitoring noise characteristics (e.g. spectral energy distribution, transients, broadband levels) and animals of interest (approaching and within the zone) during the construction phase. Furthermore, the FEIS must ensure that the operational zone includes a strong mitigation system once an animal

comes within the safety exclusion zone. The DEIS indicates that one qualified NMFS observer will be stationed at the site during construction to monitor for marine animals of concern within the 500 m perimeter of pile driving sites. This is insufficient. The observation plan should be augmented by having a total of 4 on-site spotters, and an underwater acoustic monitoring system for detection of marine mammal sounds and for monitoring the intensity of the sounds produced by construction activities (e.g., pile driving, vessel traffic). Underwater autonomous or cabled seafloor recording systems are available for detection of sounds made by whales and should be installed as part of a warning system that would monitor for the presence of marine animals (particularly endangered species) in the area during construction. A strong mitigation protocol for ensuring that intense noise production is halted rapidly if and when these animals enter the radius must also be developed for the FEIS. This would include a number of modeling exercises predicting the potential exposures and risks to a representative suite of animals (mysticetes, odontocetes, pinnipeds, sea turtles, and fishes). Such procedures have become standard components of FEIS documents in which noise impacts are of concern.

Scheduling of Pile Driving. In the development of the FEIS, careful attention must be given to the scheduling of pile driving with respect to periods of peak use by marine mammals and turtles. Permit conditions should require that pile driving should be scheduled only during time periods when the probability of marine mammals and sea turtles in the area is low.

Acoustic underwater monitoring. The permit should require that a simple, distributed network of underwater acoustic monitoring stations be in operation

throughout construction, operation and decommission phases of the project. This network should at least be used to: (1) increase the probability of detecting and identifying marine mammals in the area, and (2) to monitor acoustic signal strength due to pile driving and (3) to halt operations if sound levels exceed the threshold at the perimeter of the exclusion zone or if rare or endangered species enter the area. It is not sufficient to rely on previous observations that animals often avoid areas with noise sources and then to assume that there will be no animals in the area during noise producing activities. It would be beneficial from many viewpoints for the Project to install, maintain and utilize a network of in-air and underwater sensors to monitor project activities. The in-air network would include calibrated microphones, accelerometers, anonometers etc. The underwater network would include calibrated hydrophones, current meters, particle counters, pyrometers: basically, sensors to provide data on energy distribution or environmental proxies that are influenced by the wind farm's installation or operational activities (e.g., turbidity, noise, suspended particles). It could also become a component in a larger network of environmental monitoring along the eastern seaboard. This network, taking shape under various guises (e.g., ocean observatories, homeland coastal security, littoral monitoring systems), is already emerging within several different agencies and institutions. Partial funding to assist in this acoustic monitoring might be available from these agencies and from the U.S. Department of Energy.

III. AVIAN IMPACTS

The Project's potential avian impacts present the most challenging and complex issues presented in the DEIS and by the Project. As an initial matter, as the DEIS discusses, evidence from land-based wind turbines indicates that bird mortality from

wind turbines is usually small, and not sufficient to harm populations. For the sake of comparison, data combined for all of the United States indicates that mortality due to wind turbines is much less than that attributed to glass windows, domestic cats, or hunting, each of which produces over a million bird deaths per year. However, wind turbine bird impacts vary from site to site and from species to species. Inappropriately sited wind turbines, such as the Altamont Pass project in California, can kill significant numbers of birds. Evidence from European off-shore wind projects is inconclusive. At one site near the Wadden Sea in the Netherlands, 14 to 50 bird deaths per year per turbine were observed, and most of these were water birds, including many sea ducks.[15] A 2003 review report for two Danish offshore wind farms, Horns Rev and Nysted (80 and 72 turbines, respectively), while not quantifying bird mortalities, provided cautious initial indications based on limited data that birds are adopting migration behavior that avoids collision with the turbines by either avoiding the wind farm or flying in the corridors between turbine rows.[16]

Adding to the complexity of the issue, as the DEIS correctly concludes, the fossil fuel-generated electricity that the Project will displace has a high and well documented impact on habitat used by birds and other wildlife. For example, the population of the sea bird that is most abundant in Nantucket Sound, the common eider, underwent a massive population crash in Massachusetts during World War II in response to an oil spill.[17] Spills of oil being transported for power generation continue to be a major source of

[15]Winkelman, 1995.

[16] Review Report 2003, The Danish Offshore Wind Farm Demonstration Project: Horns Rev and Nysted Offshore Wind Farm (Sept. 2004) at 36, 94.

[17] Burnett and Snyder, 1954.

water bird mortality. For instance, in April 2003, the spill from the *Bouchard No. 120* in Buzzards Bay killed at least 450 protected birds and impacted 90 miles of coastline. The combined scale of this source of mortality is orders of magnitude greater than any documented impact from a wind power facility. The mining of coal, acid precipitation, deposition of mercury and other metals, and global warming are all having serious impacts, on forest habitat, breeding areas in the arctic, loss of estuarine habitat, and impacts to the aquatic life that serves as food for so many birds.

Given the site specific nature of wind turbine impacts on birds, it is crucial to have a full understanding of the Project's impact on the numerous and important bird populations that are found in Nantucket Sound, particularly the endangered Roseate Terns, and to ensure that the Project will not jeopardize these populations. There appear to be data gaps, conflicting data and/or different expert opinions about the potential impact of the Project on Roseate Terns. Outstanding questions include the extent to which Roseate Terns regularly transverse the area where the Project would be sited and the height at which they would fly. It is not clear to us whether these issues can be resolved by reexamining existing data, e.g., radar data, or whether additional monitoring and data collection must be performed, and if so, whether any such additional monitoring must be undertaken immediately or whether it can take place post-permit issuance under an adaptive management approach. Our suggestion is that the Corps and the Fish and Wildlife Service immediately convene a group of independent scientists, with input from the developer, other interested stakeholders and their respective science advisors, both to consider these issues and to provide recommendations on what additional steps must be taken to resolve these issues prior to issuance of the FEIS. Because of the importance of

this Project and the importance of making sure that the environmental issues are satisfactorily analyzed and resolved, the U.S. Department of Energy National Renewable Energy Laboratory should be invited to join this process and to provide funding for it. The numerous environmental and public health benefits of the Project warrant a creative approach to resolving the questions that still appear to surround the potential bird impacts posed by the Project.

IV. MONITORING AND ADAPTIVE MANAGEMENT

A well-developed environmental monitoring and adaptive management program will be critical to the success of this project, and should be included in the FEIS. Even with additional pre-construction data collection, it will only be through the deployment of a well developed monitoring program during operation of the turbines that the actual impacts can be fully understood. Monitoring should produce the information required for minimizing impacts through adaptive management and for planning future projects.

The adaptive management scheme that we suggest incorporating into the permit is fully consistent with the Army Corps of Engineers' existing requirements for Section 10 permits. Adaptive management is a concept with which the Corps is demonstrably familiar. Though there is no reference to adaptive management in the regulations governing the grant of Section 10 permits, the Corps has defined the term elsewhere in its regulations. Adaptive management is a major facet of the Comprehensive Everglades Restoration Plan, and is defined in that context as "seeking continuous refinements in and improvements to the Plan to respond to new information resulting from changed or unforeseen circumstances, new scientific and technical information, [and] new or updated modeling…" 33 CFR § 385.3

Although there are no specific regulations on adaptive management for a Section 10 permit, an adaptive management approach is consistent with Section 10's general mitigation requirements, 33 C.F.R. § 320.4(r)(1), which include compensatory mitigation "for significant resource losses which are specifically identifiable, reasonably likely to occur, and of importance to the human or aquatic environment." 33 C.F.R. § 320.4(r)(2). "The nature and extent of mitigation conditions [required] are dependent on the results of the public interest review in 33 C.F.R. § 320.4." 33 C.F.R. § 325, App. B. The adaptive management approach that we advocate is also consistent with the overarching Section 10 requirement that the Corps "ensure that the project is not contrary to the public interest." 33 C.F.R. § 320.4(r)(1)(iii).

Adaptive management is also regularly used by other agencies, including the Fish and Wildlife Service when permitting under the Endangered Species Act, when there is a "data gap" which means that "the long-term effects of implementing" a plan on one or more species cannot be determined. U.S. Department of the Interior, Fish and Wildlife Service, U.S. Department of Commerce, National Oceanic and Atmospheric Administration, and National Marine Fisheries Service, Habitat Conservation Planning and Incidental Take Permit Processing Handbook, (Nov. 4, 1996) *at* http://www.artba.org/public/docs/enviro/articles2/HCP%20handbook.pdf. Rather than denying a permit or simply accepting potential damage to a protected species when there is not sufficient information to project the impact on that species, the FWS requires adaptive management as a condition of the permit – continuous monitoring to determine the actual impact and appropriate mitigation thereof.

A program of environmental monitoring and adaptive management should be developed with the benefit of a scientific advisory board, including academic and government scientists who can help to develop an appropriate set of protocols for data collection and adaptive responses to unacceptable environmental impacts. The FEIS should include a delineation of specific adaptive responses that could be implemented to deal with environmental impacts that are judged to be reasonable possibilities at the chosen site and considering the uncertainties that exist in our ability to predict impacts. Such impacts might include, for example, impact to a particular bird species, where the mortality rate is found to be high. Potential adaptive responses should include the option of short-term shut-downs if it is determined that a shut-down within a particular time window could substantially reduce population-level impacts. A framework for adaptive responses must be developed that prevents abuse of an adaptive management program, and also protects the project operator from uneconomic conditions. A reasonable budget for annual number of days allocated for possible use in shut-down response should be established, and utilized, if necessary, with guidance from the science advisory board and data collected under the monitoring program. The information collected as part of this data monitoring process will be critically important to the consideration of other off-shore wind farms. Thus, it is appropriate to look for additional funding and support for this program from state and federal government sources, e.g. the National Renewable Energy Laboratory. The science advisory committee, or another independent body, should be involved to ensure that data collection is objective and transparent. All environmental data collected from this project, sited on land subject to the public trust, should be made available to the public, in electronic form, in a real-time fashion when possible or with a

minimal delay when necessary for data processing (e.g. not more than two months latency).

The monitoring program should include pre-construction monitoring, monitoring of impacts during construction, and most critically, an effective system for monitoring and adaptive management during wind farm operation.

A carefully planned program of ongoing monitoring and adaptive management of the wind farm must be included in the FEIS, including innovative approaches to sampling so that reliable estimates of environmental impacts can be made during turbine operation. This must include measurement of species-specific mortality rates for birds flying in the rotor swept zone. The monitoring program should be expanded to include two phases of post-construction monitoring. Phase I should be a period of relatively intensive monitoring, during the first five years of the project. During this period, the ecological impacts should be quantified, any unacceptably high impacts identified, and mitigation measures developed and implemented, as needed. The monitoring program should be designed with a number of specific objectives but must also be designed in such a fashion as to increase the likelihood of detecting effects that have not been anticipated (i.e. through monitoring an array of ecological indicators). The data and protocols developed during phase I should be used to set the objectives for long-term monitoring conducted during phase II, with guidance from the scientific advisory board. Protocols used during phase II must be adequate to detect changes in steady state impacts, and provide the information needed for adaptive responses. For example, there may be a particular time window each year when some form of biological impact was demonstrated to be unacceptably high during phase I. Should this be the case, phase II monitoring, and

adaptive management, should include protocols for reducing impact during a specific time window defined by ecological or behavioral criteria.

Essential objectives for monitoring should include: 1) species-specific mortality rates for flying animals in the rotor swept zone; 2) assessment of the behavior of marine mammals around the wind farm; 3) assessment of fishes around the wind farm; and 4) assessment of benthic communities.

CONCLUSION

The environmental standards set for the Cape Wind project will create an important precedent for the future of renewable energy in the United States, so it is crucial us to set the bar in the right place. The air quality, public health and global warming benefits of the Project are significant and beyond rational dispute. It is also axiomatic that in order for the Cape Wind project to move forward, the Final EIS must demonstrate that the project is consistent with protecting marine wildlife and applicable laws. Indeed, Cape Wind should strive to be a model for future environmentally sensitive offshore wind projects. The approach that NRDC sets forth in these comments, if followed, provides the best path to realizing the tremendous emissions and energy benefits of the Cape Wind project while also creating a responsible and positive model for future offshore wind development.

Respectfully Submitted,

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